

CURRICULUM VITAE

Daniel A. Jaffe

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EDUCATION:

B.S. Chemistry, February 1979, Massachusetts Institute of Technology
M.S. Chemistry, December 1983, University of Washington
Ph.D. Chemistry, June 1987, University of Washington; graduate work in inorganic, analytical and atmospheric chemistry, atmospheric sciences and environmental sciences

PROFESSIONAL EXPERIENCE:

Professor—University of Washington-Bothell, Interdisciplinary Arts and Sciences, September 1997-current. (Promoted to full Professor in September 1999).
Coordinator for Science, Technology and the Environment. UWB, September 1997-current.
Adjunct Professor of Atmospheric Sciences, December 1997-current.
Associate Professor of Chemistry--University of Alaska Fairbanks, Department of Chemistry/Geophysical Institute, June 1993 - September 1997. (promoted to full professor June 1997).
Assistant Professor of Chemistry--University of Alaska Fairbanks, Department of Chemistry/Geophysical Institute, September 1987 - June 1993.
Pre-doctoral Instructor, University of Washington, January 1984 - March 1987
Teaching Assistant, University of Washington, September 1982 - December 1986
Teacher- North Andover High School, North Andover, MA, September 1979 -June 1981.

RESEARCH

The main theme of my research is on global environmental pollutants and long range transport (especially ozone, nitrogen oxides, CO, sulfur oxides, and heavy metals) in the Arctic and Pacific regions.

PEER-REVIEWED PUBLICATIONS

1. Weiner, R.F. and D.A. Jaffe, A Study of the PSD Permitting Process in EPA Region X, J. Air Pollut. Control Assoc., 33 (8), 797, 1983.
2. Jaffe, D.A. An FT-IR Study of Acetic Acid and Deuterated Analogues in the Monomer O-H, and O-D Stretching Regions, Spectrochimica Acta, 43A, 1393-1396, 1987.
3. Jaffe, D.A., Accuracy of Measured Ammonium Nitrate Equilibrium Values, Atmos. Environ, 22, 2329, 1988.
4. Honrath, R.E. and D. A. Jaffe, Measurements of Nitrogen Oxides in the Arctic, Geophys. Res. Lett., 17, 611-614, 1990.
5. Jaffe, D.A., Local Sources of Pollution in the Arctic: from Prudhoe Bay to the Taz Peninsula in Pollution of the Arctic Atmosphere, ed. W. Sturges, Elsevier Science Pub. Ltd., NY, 1991.
6. Jaffe, D.A. and N.J. Rose, The Heat of Dimerization of Acetic Acid and the Heat of Decomposition of Ammonium Acetate as Determined by FT-IR Spectroscopy, Spectrochimica Acta, 47A, 1695-1705, 1991.
7. Jaffe, D.A., R. E. Honrath, J. A. Herring, S. M. Li, and J. D. Kahl, Measurements of Nitrogen Oxides at Barrow, Alaska During Spring: Evidence for Regional and Northern Hemispheric Sources of Pollution, J. Geophys. Res., 96, 7395-7405, 1991.
8. Jaffe, D.A., The Nitrogen Cycle in Global Biogeochemical Cycles, eds. S. Butcher, R. Charlson, G. Orians, and G. Wolfe, Academic Press, NY, 1992.
9. Honrath, R.E. and D.A. Jaffe, The Seasonal Cycle of Nitrogen Oxides in the Arctic Troposphere at Barrow, Alaska, J. Geophys. Res., 97, 20,615-20,630, 1992.
10. Jaffe, D.A. and M. D. Zukowski, Nitrate Deposition to the Alaskan Snowpack, Atmos. Env., 27A, 2935-2941, 1993.
11. Jaffe, D.A., Relationship Between Anthropogenic Nitrogen Oxides and Ozone Trends in the Arctic Troposphere, In: (eds) H. Niki and K.H. Becker, The Tropospheric Chemistry of Ozone in the Polar Regions. NATO ASI Series, Springer-Verlag, N.Y., 1993.
12. Baklanov, A., D.A. Jaffe, and B.M. Cerundolo, Deposition of Air Pollutants on the Kola Peninsula During 1990-1991, In: ed, M. Kozlov, Aerial Pollution in the Kola Peninsula, Univ. of Turku Press, Turku, Finland, 1993.
13. Jaffe, D.A., B.M. Cerundolo, and J. A. Kelley, The Influence of Redoubt Volcano Emissions on Snow Chemistry, J. Volcanology and Geophys. Res., 62, 359-367, 1994.
14. Jaffe, D.A., E. Leighton, and M.A. Tumeo, Environmental Impact on the Polar Regions. Forum for Appl. Res. and Policy, 9, 65-70, 1994.
15. Jaffe D.A., Iversen T., Shaw G., Comment on "A long term decrease in arctic haze at Barrow, Alaska" by B.A. Bodhaine and E.G. Dutton. Geophys. Res. Letts. 22, 739-740, 1995.
16. Jaffe, D.A., B. Cerundolo, J. Rickers, R. Stolzberg, and A. Baklanov, Deposition of Sulfate and Heavy Metals on the Kola Peninsula, Sci. Total Environ., 160/161, 127-134, 1995.
17. Kelley, J.A., D. A. Jaffe, A. Baklanov, and A. Mahura, Heavy Metals on the Kola Peninsula: Aerosol Size Distribution, Sci. Total Environ., 160/161, 135-138, 1995.

18. Jaffe, D.A., R.E. Honrath, D. Furness, T.J. Conway, E. Dlugokencky, and L.P. Steele, A Determination of the CH₄, NO_x, and CO₂ Emissions from the Prudhoe Bay, Alaska Oil Development, *J. Atm. Chem.*, 20, 213-227, 1995.
19. Jaffe, D.A. and S. Herndon, The Measurement of Carbon Monoxide in Auto Exhaust by Gas Chromatography, *J. Chem. Ed.*, 72, 364-366, 1995.
20. Jaffe, D. A., R. E. Honrath, L. Zhang, H. Akimoto, A. Shimizu, H. Mukai, K. Murano, S. Hatakeyama, and J. Merrill, Measurements of NO, NO_y, CO and O₃ and Estimation of the Ozone Production Rate at Oki Island, Japan During PEM-West, *J. Geophys. Res.*, 101, 2037-2048, 1996.
21. Akimoto, H., H. Mukai, N. Masataka, C.-M. Liv, M. Buhr, K.T. Hsu, D.A. Jaffe, L. Zhang, R. Honrath, J.T. Merrill, and R.E. Newell, Long Range Transport of Ozone in the East Asian Pacific Rim Region, *J. Geophys. Res.*, 101, 1999-2010, 1996.
22. Beine, H.J., M. Engardt, D.A. Jaffe, Ø. Hov, K. Holmen, and F. Stordal, Measurements of NO_x and aerosol particles at the Ny Ålesund Zeppelin mountain station on Svalbard: Influence of regional and local pollution sources, *Atm. Env.* 7, 1067-1079, 1996.
23. Beine, H.J., D.A. Jaffe, D.R. Blake, E. Atlas, and J. Harris, Measurements of PAN, Alkyl nitrates, ozone and hydrocarbons during spring in Interior Alaska, *J. Geophys. Res.* 101, 12,613-12,619, 1996.
24. Jaffe, D.A., T. Berntsen, I.S.A. Isaksen, A Global 3D Chemical Transport Model; 2. Nitrogen Oxides and Non Methane Hydrocarbon Results. *J. Geophys. Res.* 102, 21,281-21,296, 1997.
25. Solberg S., T. Krognes, F. Stordal, Oslash; Hov, H. J. Beine, D. A. Jaffe, K. C. Clemitshaw, S. A. Penkett. Reactive Nitrogen Compounds at Spitsbergen in the Norwegian Arctic. *J. Atm. Chem.* 28, 209-225, 1997
26. Emmons, L.K. et al., Climatologies of NO_x and NO_y: A Comparison of Data and Models. *Atmos. Env.* 31, 1851-1904, 1997.
27. Beine, H.J., Daniel A. Jaffe, John A. Herring, Jennifer A. Kelley, Terje Krognes, Frode Stordal. High Latitude Springtime Photochemistry Part I: NO_x, PAN and Ozone Relationships *J. Atm. Chemistry* 27, 127-153, 1997.
28. Herring, John A., Daniel A. Jaffe, Harald J. Beine, Sasha Madronich, and Donald. R. Blake. High-Latitude Springtime Photochemistry Part II: Sensitivity Studies of Ozone Production *J. Atm. Chemistry* 27, 155-178, 1997.
29. Jaffe D.A., Griffin D., and Ricker J. Analyzing Cigarette Smoke. *The Science Teacher* v.64 (December), 29-33, 1997.
30. Beine H., Jaffe D.A., Stordal F., Engardt M., Solberg S., Schmidbauer N. and Holmén K. NO_x during ozone depletion events in the Arctic troposphere at Ny-Ålesund, Svalbard. *Tellus* 49, 556 - 565, 1997.
31. Jaffe, D.A., Mahura A., Kelley, J., Atkins J., Novelli P.C. and Merrill J. Impact of Asian Emissions on the Remote North Pacific Atmosphere: Interpretation of CO Data from Shemya, Guam, Midway and Mauna Loa. *J. Geophys. Res.* 102, 28,627-28,636, 1997.
32. Jaffe, D.A., L.N. Yurganov, E. Pullman, J. Reuter, A. Mahura, and P.C. Novelli. Measurements of CO and O₃ at Shemya, Alaska. *J. Geophys. Res.* 103, 1493-1502, 1998.

33. Yurganov, L. N. ; Jaffe, D. A. ; Pullman, E. ; Novelli, P. C. Total column and surface densities of atmospheric carbon monoxide in Alaska, 1995. *J. Geophys. Res.*103, 19,337-19,347, 1998.
34. Baklanov A., Mahura A.G., Jaffe D., Thaning L., Bergman R., Andres R., and Merrill J. Atmospheric Transport Pathways and Possible Consequences after a Nuclear Accident in Northwest Russia. 11th World Clean Air Congress. Volume 2, E6, 1-6, 1998.
35. Mahura A.G., Jaffe D.A., Andres R.J., and Merrill J.T. Atmospheric transport pathways from the Bilibino nuclear power plant to Alaska. *Atmos. Env.* 33, 5115-5122, 1999.
36. Jaffe D.A., Anderson T., Covert D., Kotchenruther R., Trost B., Danielson J., Simpson W., Berntsen T., Karlsdottir S. Blake D., Harris J., Carmichael G. and Uno I. Transport of Asian Air Pollution to North America. *Geophys.Res.Letts.* 26, 711-714, 1999.
37. Anderson, T. L., Covert, D. S., Wheeler, J. D., Harris, J. M., Perry, K. D., Trost, B. E., Jaffe, D. J., and Ogren, J. A. Aerosol backscatter fraction and single scattering albedo: measured values and uncertainties at a coastal station in the Pacific NW, J. *Geophys. Res.* 104, 26793-26807, 1999.
38. Berntsen T.K., Karlsdottir S. and Jaffe D.A. (1999) Influence of Asian emissions on the composition of air reaching the Northwestern United States. *Geophys.Res.Letts.* 26, 2171-2174, 1999.
39. Jaffe D.A. and Chavasse L. Comparing the CO content of cigarette smoke and auto exhaust using gas chromatography. *J.College Sci. Teaching.* Dec. 1999.
40. Lloyd S. et al. (21 coauthors including D. Jaffe). Total Ozone Observations and Trend at Fairbanks during POLARIS. *J.Geophys.Res.* 104, 26,767-26,778, 1999.

TECHNICAL REPORTS

- Jaffe, D.A., Herring, J., and Madronich S., Impact of Large Solar Zenith Angles, Total Column Ozone and New O¹D Quantum Yields on Atmospheric Chemistry at High Latitudes. *IGAC Activities Newsletter.* 14, 8-10, 1998.
- Jaffe, D., A. Mahura, R. Andres, A.Baklanov, L.Thaning, R.Bergman, and S.Morozov. Atmospheric Transport Pathways from the Kola Nuclear Power Plant. Barentsregion Environmental Centres Network, University of Tromso, Norway. ISBN 82-7934-000-9 . February 1998.
- Jaffe, D., A. Mahura, R. Andres. Atmospheric Transport Pathways to Alaska from Potential Radionuclide Sites in the Former Soviet Union. Report to Alaska Department of Environmental Conservation (ADEC) UAF-ADEC Joint Project 96-001, February 1997.
- Jaffe, D., A. Mahura, R. Andres, A.Baklanov, A.Thaning, L.Bergman and S.Morozov. Atmospheric Transport from the Kola Nuclear Power Plant. Pilot Study Research Reoprt. UAF-FOA-BECN Joint Report, p.61, 1998.

FUNDED RESEARCH PROPOSALS

Proposals with D. Jaffe as the sole Principal Investigator:

- Identification of Sources and Long Term Trends for Pollutants in the Arctic. (through UW-JISAO), NOAA Cooperative Institute for Arctic Research (CIFAR). Two year total \$127,667. May 1998-2000.
- Photochemical Ozone Budget of the Eastern North Pacific Atmosphere (PHOBEA). National Science Foundation/Atmospheric Chemistry, 4 year total, \$475,000. ATM-9529604 and ATM-9896270 (transferred to UW), June 1996-June 2000. This project made airborne and ground based measurements of a wide array of photochemically active species. The Wyoming Kingair was used for airborne observations and the University of Washington's Cheeka Peak Observatory was used for ground based observations.
- Identification of Sources and Long Term Trends for Pollutants in the Arctic using Clustered Trajectory Analysis. NOAA, Cooperative Institute for Arctic Research (CIFAR). One year total, \$60,000. May 1997-May 1998.
- Benzene and Carbon Monoxide as Air Pollutants in Fairbanks, Alaska. Partners in Science: with Janet Ricker (West Valley High School). Research Corp, 2 year total, \$14,000. June 1997-June 1999.
- Impact of East Asian Emissions on CO and O₃ Concentrations in the North Pacific Atmosphere. NOAA Climate and Global Change Program, NA36GPO253, 3 year total \$180,000., May 1993-May 1996.
- Ground-Based Measurements of Nitrogen Oxides as Part of the Pacific Exploratory Mission-West (PEM-West) Program. NSF, ATM-9022004, 2 years grant June 1991-June 1993, 2 year total \$99,000.
- A Study of the High Latitude Nitrogen Oxide Reservoir, NSF Division of Atmospheric Sciences/ Atmospheric Chemistry, ATM-9215127, 3 year total \$373,800., Sept. 1992-June 1996
- Tropospheric Nitrogen Oxide Chemistry in Central, Alaska. NSF Division of Atmospheric Sciences/ Atmospheric Chemistry, ATM-8814518, Oct. 1988- March 1992. 3 year total \$299,202.

Multiple PI Projects:

- Ozone Vertical Profile Measurements at Fairbanks, Alaska in Support of the Polaris Campaigns. NASA, 7 month total \$58,250, April 1, 1997-October 30, 1997. Principal Investigator: Samuel J. Oltmans; Co-Investigators: Daniel Jaffe, Bryan Johnson.
- Atmospheric Transport Pathways to Alaska from Potential Radionuclide Sites in the Former Soviet Union, Sept. 1995-December 1996, \$40,000. PI: Dr.Dan Jaffe, Co-PI: Dr.Robert Andres (UAF-INE), Funded by the State of Alaska.
- Soviet Arctic Haze: A study of Pollution in Northern Russia, Earthwatch, \$30,000 (approximate total) + volunteer labor, co-PI with Alexander Baklanov, Kola Science Center, Russia, March 1990-September 1993.
- Gaseous Emissions of Redoubt Volcano. USGS/Alaska Volcano Observatory. 1 year grant, May 1990-May 1991, \$34,143. (This is a multiple PI effort,

the funds listed are for the portion on gas and snow chemistry for which D.Jaffe was the sole PI).

INVITED PRESENTATIONS

- Presentation at Ecological Society of America (ESA) workshop on Atmospheric deposition to the Pacific Coast. Invited talk on tools for assessing long range transport of pollutants and invited poster on Transport of Asian air pollution to North America. UCLA, February 2000.
- Presentation at international workshop in Nagoya, Japan on Transport of Asian air pollution to the U.S. and results from the 1999 PHOBEA observations". November 1999.
- Presentation at University of British Columbia on Transport of Asian air pollution to North America, October 1999
- Presentation at Portland State University on Transport of Asian air pollution and results from 1999 PHOBEA observations", November 1999.
- Presentation at Washington State University-Vancouver on Transport of Asian air pollution and results from 1999 PHOBEA observations", November 1999.
- Presentation at workshop on Ozone and vegetation impacts. "Transport of Asian air pollution to North America. University of Tokyo, Nov. 1998.
- Presentation at Washington State University on "Transport of Asian pollutants to the U.S. West Coast", Feb. 1998.
- Presentation at workshop on Ozone in the Asia Pacific region. University of Tokyo, Nov 1996.
- Presentation to Lawrence Livermore National Laboratory on Potential Sources of Radionuclides in Alaska from Sources in the Former Soviet Union. Livermore, CA. Oct 1996.
- Presentation at the US-Japan Workshop on Arctic Research. Fairbanks, Alaska, February 1996.
- Presentation to joint Office of Naval Research on Acidification in the Arctic-U.S. EPA workshop on Arctic Contaminants. Fairbanks Alaska, August 1996.
- Presentation to Japanese scientists on Asian pollutants in the Pacific. University of Tokyo- January 1996
- Invited participant on NASA team to evaluate the Hong Kong air monitoring station. Hong Kong, October 1995.
- NASA Nitrogen Oxide Evaluation panel. Menlo Park, CA, December 1993.
- NATO Advance Research Workshop on "The Tropospheric Chemistry of Ozone in the Polar Regions". Halifax, Nova Scotia, August 1992.
- Workshop on Tropospheric Ozone in the Polar Regions, Halifax N.S., August 1992.
- NSF Working Group Participant to develop a research plan for an arctic photochemistry experiment (TAPESTRIES). Washington, D.C., May 1992,
- Earthwatch Principal Investigators' Meeting. Invited to present an overview of our Earthwatch sponsored research on air pollution in the Kola Peninsula, Russia, Boston, MA, March 1992 and March 1991.

Alaska Clean Seas workshop on "In-Situ Burning". Invited to give luncheon address on putting the air pollution aspects of in-situ burning (the burning of oil after an oil spill) into a global perspective. Anchorage, AK, November 1991.

Symposium on the Tropospheric Chemistry of the Antarctic Region. Invited Participant. June 1991, Boulder, CO.

NASA PEM-West Science Team Meeting. As a participant in the International Global Atmospheric Chemistry Program's experiment (PEM-West), I was an invited attendee at this meeting. PEM-West is an international experiment to document the transport of air pollutants from the Asian continent to remote Pacific atmosphere. Herndon, VA, April 1991.

Invited presentation to Corvallis, OR, office of the EPA on arctic air pollution, January 1991.

Invited presentation to NOAA GMCC lab in Boulder, CO, on the results of our Barrow measurement campaigns. January 1991,

Invited presentation on Arctic Pollution; International Symposium on Environmental Problems of the North. Murmansk, USSR- February 1990

OTHER PROFESSIONAL ACTIVITIES

Co-char of IGAC-Atmospheric Chemistry Education subcommittee (with J.Boonjawat) to develop courses in atmospheric chemistry in developing regions of the world.

Member Steering Committee for International Global Atmospheric Chemistry (IGAC) projects on Asia-Pacific (APARE) and Polar regions (PASC). 1995

National Academy of Sciences, Young Investigation Program on Arctic Ecology, US-Russian exchange Program, 1993-1994.

Chosen to attend the National Center for Atmospheric Research's 1986 Summer Colloquium; Boulder, CO. One of 30 international graduate and post-doctoral students selected to meet with NCAR's scientific staff to discuss current topics in atmospheric chemistry. July 1986.

Sabbatical leave during AY 1993-1994 at the University of Oslo working with Dr.Ivar Isaksen on global chemical pollutant modeling.

Formerly certified secondary science teacher, Massachusetts and Washington

Member of the American Chemical Society

Member of the American Geophysical Union

Several Lectures At the University of Oslo and the Norwegian Institute for Air Research during my sabbatical. 1993

Reviewer for the Journals: Atmospheric Environment, Journal of Geophysical Research; Geophysical Research Letters; Environmental Science and Technology; Journal of Atmospheric Chemistry; Environmental Pollution; and Science of the Total Environment.

Proposal reviewer for the National Science Foundation, NASA and NOAA.

UNIVERSITY SERVICE

University of Washington-Bothell

Developed and coordinated approval for UWB's first science degree (B.S. in Environmental Science) February 1998-current

Coordinator for Science, Technology and the Environment (STE) option within Interdisciplinary Arts and Sciences, September 1997-current
 Extensive curriculum development for science at UWB (8 new courses proposed), September 1998-current
 Development of outreach program for community colleges to recruit science students to UWB, January 1998-current.
 Chair of Biology/Ecology search committee, October 1997-February 1998.
 Chair of review committee for several adjunct faculty in science and mathematics. September-December 1997.
 Advisor on science labs for new UWB campus, September 1997-current.
 Advisor for integration of wetlands studies into UWB curriculum, September 1997-current.
 Development of budget request for new UWB science labs, February 1998.
 Coordinate usage of new science labs with Cascadia Community College that will be co-located at the UWB site.
 Member Personnel and Academic affairs sub-committees in IAS

University of Alaska-Fairbanks
 Chairman, College of Natural Sciences Curriculum Council, University of Alaska Fairbanks, Sept. 1992-June 1993. Member of committee Sept. 1991-Sept. 1992.
 UAF Chairman of the "Billion Pound Diet", campus-wide educational program on energy conservation, AY 1990-1991.
 UAF member representative to the University Corporation for Atmospheric Research (UCAR), October 1991, 1992.
 Department of Chemistry Search committees: 1991 (2), 1993, 1995.
 Advisor to the University "Climbing Wall Committee"
 Faculty advisor to the Student Conservancy (1992-current).
 Faculty Advisor to the Student Environmental Club, 1991-1993.
 Faculty Advisor for the Student Chapter of the Northern Alaska Environmental Center, 1990-1992
 Faculty Advisor for the Student "Science Outreach" program, 1992.
 Department of Chemistry graduate committee (current).
 UAF representative to the University Corporation for Atmospheric Research annual members meeting: 1989, 1992.
 UAF representative for negotiations with the Alaska Department of Environmental Conservation on creation of the joint UA-ADEC cooperative agreement, November 1994.
 Member of UAF task force on Arctic Pollution issues (Under Dr. DeLaca)
 Member UAF Graduate School's working group on development of an Atmospheric Chemistry Interdisciplinary Ph.D, 1992.

PUBLIC SERVICE

Numerous discussions with EPA officials on the implications of long range transport of Asian air pollution to the U.S. 1998-1999.
 Several public presentations on long range transport of Asian air pollution to the U.S. 1997-1998.

Lecturer for the second IGAC/WMO/NSF Short course on Atmospheric Chemistry
November 4-15, 1996 Salvador, Brazil.

Teacher/Team Leader, First IGAC/WMO/NSF Short course on Instrumentation in
Atmospheric Chemistry, Buenos Aires, Argentina, October 30-November 10,
1995.

Session Chair, Relationship between CO, O₃ and nitrogen oxides, American Geophysical
Union Fall Meeting, December 1996.

Session Chair, High Latitude Tropospheric Chemistry, American Geophysical Union Fall
Meeting, December 1995.

Member of the U.S. delegation to the Arctic Monitoring and Assessment Program.

Consultation with the Alaska Dept. of Environmental Conservation (ADEC) in Juneau in
Nov., 1994, with ADEC officials on the development of a new section within
ADEC. The new section is called "Environmental Assessment" and will include
a sub-group on Arctic Monitoring and Air Monitoring which I have been asked to
head up. I have also been asked to keep the section informed of activities within
the international Arctic Monitoring and Assessment Program.

International Global Atmospheric Chemistry Program-Committee member for Polar
(PASC) and Asia/Pacific (APARE) programs

U.S. Delegate to the Arctic monitoring and Assessment Task Force, Dec. 1991 (Tromsø)
December 1992 (Toronto), Oct. 1993 (Reykjavik), March 1994 (Tromsø), Nov.
1994 (Wash. D.C.).

Facilitator, Non-Radionuclide Contamination Technical Session, the Interagency Arctic
Research Policy Committee Workshop on Arctic Contamination. Anchorage,
Alaska, May 1993.

Session Chair, Arctic Atmospheric Chemistry Session, Arctic Science Conference,
Anchorage, Alaska, Oct. 1990.

Numerous presentations to state and local agencies on urban air quality, ozone depletion,
arctic air pollution, and etc.

Numerous presentations to Fairbanks public schools on various environmental chemistry
issues including ozone depletion, acid rain, climate change, local air quality, etc.

Judge for the annual Alaskan High School Science Symposium (1993-current)

Mentor for a number of area secondary students on science fair projects on environmental
chemistry (1988-current)

Volunteer Board member for the Northern Alaska Environmental Center from September
1995-June 1997. Board President from January 1996-June 1997.

Last updated February 2000